

#### ABSTRACT OF THE DISCLOSURE

**[0038]** A polymerization process and apparatus in which olefin monomer is polymerized in a liquid diluent in a loop reactor having a relatively smooth inner wall. Another aspect of the invention includes a first polymerization step in which at least one olefin monomer is polymerized in a liquid diluent in a loop reactor to produce a first product fluid slurry comprising liquid diluent and solid olefin polymer particles having a relatively low melt index. A second polymerization step is then provided in which at least one olefin monomer is polymerized in a liquid diluent in the same loop reactor to produce a fluid slurry comprising liquid diluent and solid olefin polymer particles having a relatively high melt index. .